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GB 1155472
GB 1108004
GB 719416
GB 485482
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(54) **Cable Clip for Variable Cable Diameters**

(57) A clip for cables, tubes, or the like elongate elements comprises a wall (1) to enclose the elements with a space (9) between the wall ends which are joined to splayed out limbs (3) which can be pressed together to pass through a hole in an enclosed plate, projections (8) on the limbs preventing withdrawal of the limbs from the hole. The wall includes parts (10) projecting into the interior space for the elements capable of being moved apart resiliently to accommodate different sizes of elements. For large elements the ends of the parts (10) snap over lugs (11) and the parts lie against the peripheral portion of the wall. Numerous embodiments are described.

Fig.1

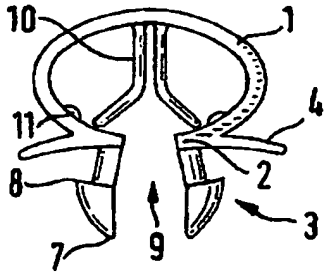

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Fig.1

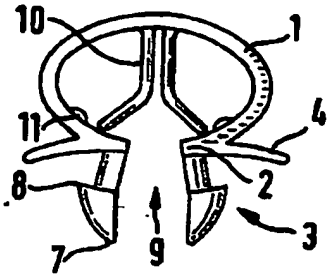

Fig.2a

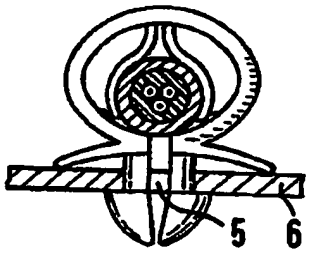

Fig.3

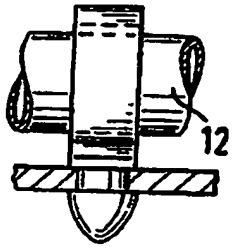

Fig.2b

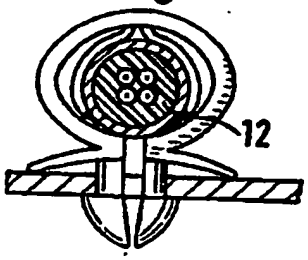

Fig.4

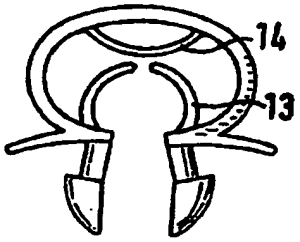

Fig.5a

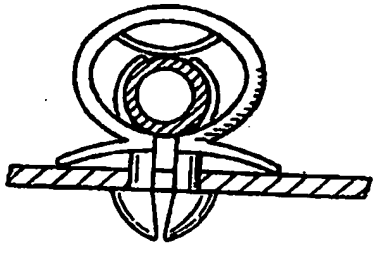

Fig.5b

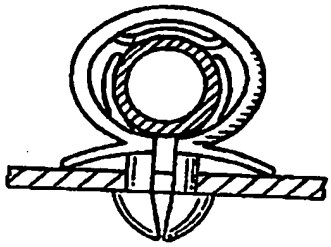

Fig.6

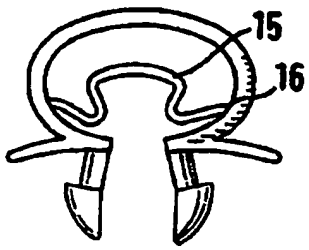

Fig.7a

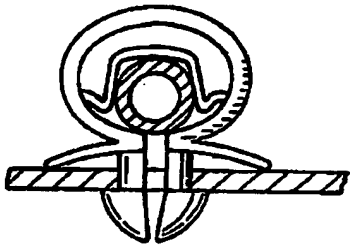

Fig.7b

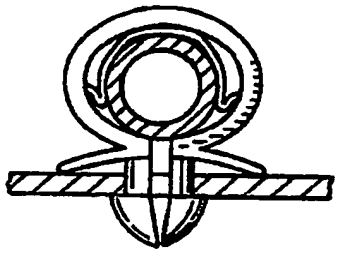

Fig.8

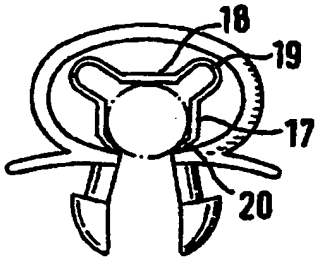

Fig.9a

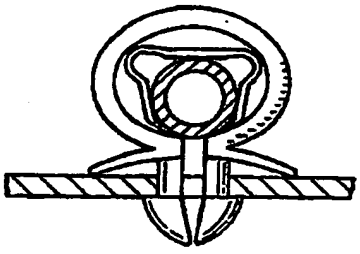

Fig.9b

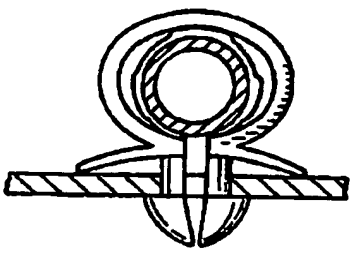

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Fig.10

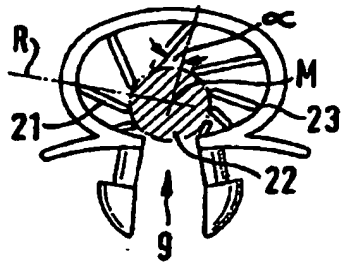


Fig.11a

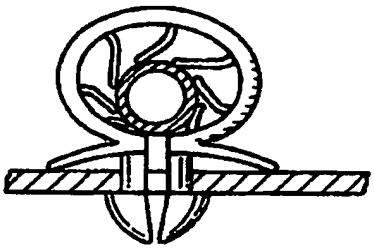


Fig.11b

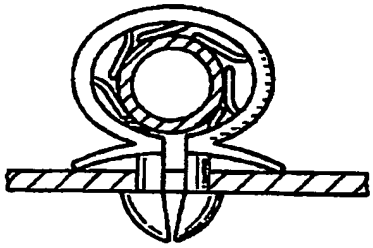
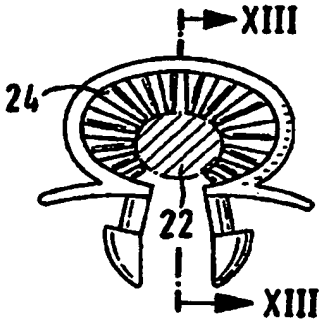


Fig.12



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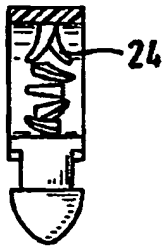

Fig.14a

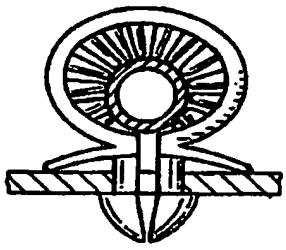

Fig.15

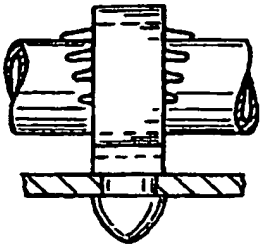

Fig.14b

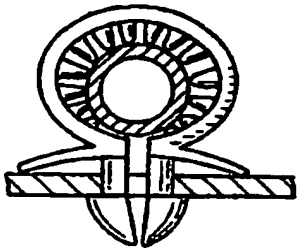

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Fig. 16

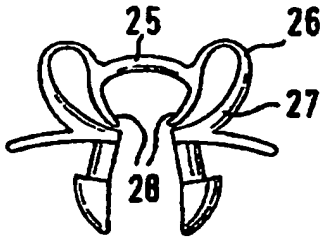

Fig. 17a

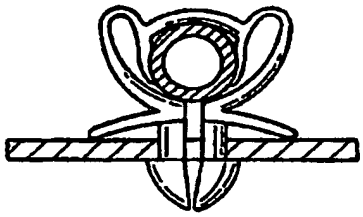

Fig. 17b

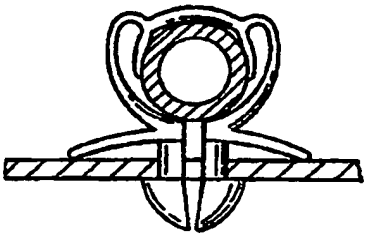

Fig. 20

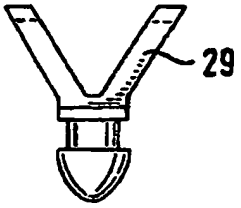

Fig. 18

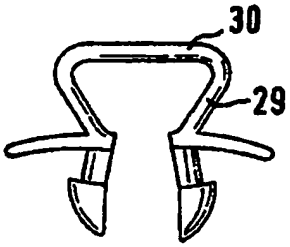

Fig. 19

Fig. 20a

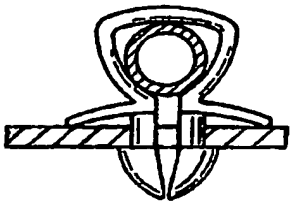

Fig. 21

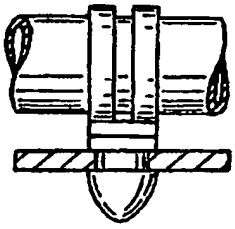

Fig. 20b

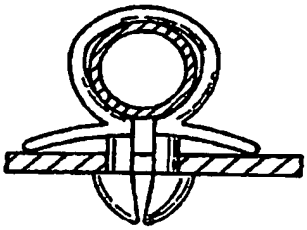

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Fig. 22

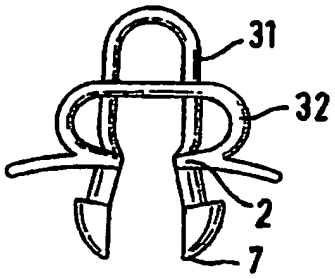


Fig. 23a

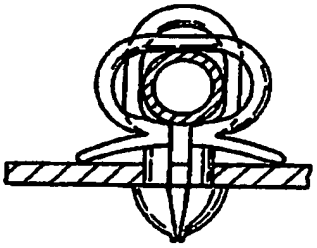


Fig. 24

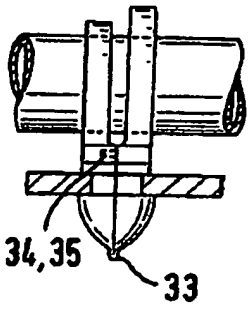


Fig. 23b

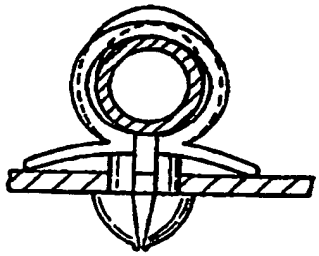
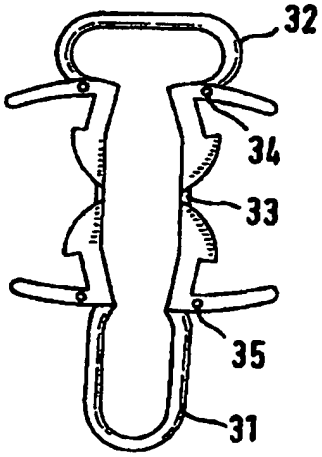


Fig. 25



SPECIFICATION

Cable Clip for Variable Cable Diameters

The invention relates to a clip for holding cables, bundles of cables, tubes and the like elongate elements, comprising a wall which completely envelops the cable or the like and which is provided with an opening at the underside, wherein each of the abutting ends of the wall is joined to half of a resiliently compressible expanding limb for insertion in the fixing holes in a supporting plate, and to a supporting shoulder projecting laterally from the wall.

When cable clips of this type are assembled they have the great advantage that insertion of the expanding limbs into the fixing holes simultaneously closes the opening of the clip, so that the elements which have to be clipped are firmly gripped. However, the prerequisite for holding the cables or bundles of cable and tubes securely is that the interior of the clip should exactly fit the diameter of the elements, in such a way that on assembly slight compression will bring the expanding limbs just together and enable them to be pushed into the fixing holes. But since the diameters of the elements to be laid frequently vary in practice—e.g. in motor vehicle construction or household appliances such as washing machines and the like—a large number of cable clips of different sizes always have to be available for laying the cables.

In the accompanying drawings:—

Figure 1 shows a cable clip according to the invention with two spring arms of the simplest construction,

Figures 2 a, b show the cable clip in the assembled state, with a thin and thick cable respectively,

Figure 3 is a side elevation of the same clip with a thick cable,

Figure 4 shows a different cable clip according to the invention with a slightly modified construction of the spring arms,

Figures 5 a, b show the same clip in the assembled state, with a thin and thick cable respectively,

Figure 6 shows a further embodiment of the cable clip with a spring strip attached at both sides of the opening,

Figures 7 a, b are the associated assembly diagrams for two cables of different sizes,

Figure 8 is a modified form of the clip with a strip which can spring open resiliently as in Figure 6,

Figures 9 a, b are the associated assembly diagrams for two cables of different sizes,

Figure 10 shows a cable clip with spring arms directed radially inwards,

Figures 11 a, b are the associated assembly diagrams,

Figure 12 is a modified form of the clip shown in Figure 10,

Figure 13 is a section through that clip,

Figures 14 a, b are the associated assembly diagrams,

Figure 15 is a side elevation of the assembled clip shown in Figure 14b,

Figure 16 shows a further form of the clip in which the wall of the clip can spring open resiliently,

Figures 17 a, b are the associated assembly diagrams,

Figure 18 shows a different version of a clip with a wall which can spring open resiliently,

Figure 19 is a side elevation of it with the wall of the clip not divided,

Figure 20 is the same side elevation with the wall of the clip divided,

Figures 20 a, b are the assembly diagrams relating to Figure 20,

Figure 21 is a side elevation of the assembly diagram of Figure 20b,

Figure 22 shows a particularly advantageous form of clip in which the wall of the clip can spring open,

Figures 23 a, b are the associated assembly diagrams,

Figure 24 is a side elevation of Figure 23b and

Figure 25 shows a practical production form for this clip.

The clip, which is shown in various embodiments, as shown in Figures 1—3 substantially comprises a clip wall 1, made of resilient bending plastics and engaging around a cable 12, limbs 3 which splay apart and each of which is integral with one end 2 of the wall 1, and supporting shoulders 4 projecting laterally from the limbs 3. The clip as supplied has the limbs 3 spaced apart. They can easily be bent apart to insert the cable 12 and can equally easily be pressed into contact with one another by hand for insertion in a fastening hole 5 in a supporting plate 6. The ends 7 of the limbs 3 have an ogival shape to facilitate insertion in the holes 5. The upper parts of the limbs 3 are shaped to fit the cross-section of the hole; approximately in the centre the limbs carry projections 8 which enable them to engage behind the rear of the supporting plate 6, while the supporting shoulders 4 rest resiliently on the front of the plate 6 after being slightly bent (see Figures 2 and 3).

In order that cable or bundles of cable with different diameters or cross-sections can be held in one and the same clip with a firm grip, two symmetrical spring arms 10 projecting into the interior of the clip are attached to the wall 1 of the clip opposite the opening 9 between the limbs 3; that is to say, the arms are integral with the wall 1. It is desirable for the spring arms to be close together for approximately half to two thirds of their length and then to open out in a funnel shape towards the opening 9. With this construction of the arms, cables or bundles of cable within a wide range of diameters can easily be held securely and centrally at the bottom of the clip, and as the arms 10 are increasingly bent open their pressure on the cable will also increase.

The spring arms 10 are forced to bend open by lugs 11 projecting on both sides of the opening 9. The lugs are mounted on the wall 1 of the clip at some distance from the ends of the arms 10, in such a way that when the clip is closed the free ends of the arms 10 are held fast by the lugs 11 and thus forced to bend open in an outward direction (Figure 2a). In addition, the distance between the lugs 11 and the opening 9 is such that, when cables in the upper range of sizes are inserted, the ends of the arms 10 slip over the lugs 11 (Figure 2b) and the arms 10 can lie right against the wall of the clip.

In the clip shown in Figures 4, 5a and 5b two spring arms 13 are fixed to the wall 1, one at each side of the opening 9, and are shaped so that they converge in an ogival shape substantially in the centre of the clip. In the space above the arms 13 a shim 14, which curves slightly towards the centre of the clip, is additionally joined to the wall 1, in such a way that the ends of the spring arms 13 just pass it as they open resiliently, and in such a way that the shim 14 will bend upwardly when thicker cables are inserted, so that the cables or the like are also held in from above.

Figure 6 shows a different embodiment of the cable clip according to the invention, with a spring strip 15 bent into an omega shape and thinner in cross-section than the wall 1 of the clip. The ends 16 of the strip 15 are joined to the wall 1 at each side of the opening 9, and the strip is curved in such a way that when it is fully extended, i.e. when a cable of the largest possible diameter is inserted, the strip 15 comes into contact with the wall 1 (Figure 7b).

A different form of this clip is shown in Figures 8, 9a and 9b. Here two parallel longitudinal walls 17, one each side of the opening 9, are joined by somewhat thinner webs 20 so as to allow for resilient opening. A transverse wall 18 of relatively rigid shape is additionally provided approximately in the centre of the clip and joined to the walls 17 by loops 19 of spring strip. The total length of the walls 17 and 18, loops 19 and webs 20 is equal in all to the length of the wall 1 between the joining points at 20, so that virtually the whole interior of the clip can be filled with cables.

Figures 10, 11a and 11b show a different embodiment of the clip, in which a plurality of spring arms 21 of different lengths are joined to the wall 1 and distributed evenly along the periphery, so that the interior of the clip is occupied apart from a vacant region 22 near the opening 9. The spring arms are directed towards the centre M of the vacant region 22, in such a way that they are all inclined in the same direction to the radial lines R, extending from the connecting points 23, at an angle of from 5 to 15°. This ensures that when a cable or the like is inserted all the spring arms 21 will yield in the same direction.

If the interior of the clip is to be filled to the optimum it is desirable to distribute enough spring arms 21 around the periphery to make the distances between the connecting points 23 slightly larger than the length of the arms 21. Only then can all the arms 21 lie flat against the wall 1. The size of the connecting points 23 again depends on the pressure required. It is advisable for the connecting points to be somewhat weaker than the wall thickness of the spring arms 21—as shown in the example—so that resilient bending can be obtained at the joint with the wall 1.

Figures 12 to 15 show a modified form of the cable clip in Figure 10, in which a plurality of spring arms 24 are again attached to the wall 1 and distributed evenly along the periphery. They are directed radially towards the centre M of the vacant region 22 in front of the opening 9 and are adapted to spring open in radial planes, by appropriate inclination in alternating directions. This form of clip, like that in Figure 10, is particularly suitable for holding bundles of cables which fill out the interior of the clip non-symmetrically.

A further embodiment of the cable clip is illustrated in Figures 16, 17a and 17b. Here an arcuate portion 25 of the wall 1, of stable shape, is drawn down towards the interior of the clip at the side opposite the opening 9 to below the clearance of the thinnest cable envisaged. This central arc 25 is then joined by ear-shaped side walls 26 to the lower end portions 27 of the wall 1; these are again of relatively stable shape. In contrast with the central arc 25 of stable shape and the lower side walls 27, the raised, ear-shaped side walls 26, however, are adapted to spring open resiliently, either through suitable makeup of the material and/or—as indicated in the example—through suitable shaping of the material, i.e. reduction in wall thickness. In order to prevent thin cables from sliding laterally into the ear cavities, spring arms 28 pointing into the interior are additionally provided at both ends of the central arc 25. These substantially cover the ear cavity, at least when small cables are accommodated and also have a centering action.

A different form of cable clip with a wall which springs open resiliently is illustrated in Figures 18 to 21. Here the wall consists of two side walls 29 which open out in a funnel shape from the opening 9, and a transverse wall 30. The walls 29 and 30 are initially straight and bend as the diameter of the cables increases. The walls may either take up the whole width of the clip (see Figure 19) or be divided over their whole length (see Figure 20). In order to increase resilience it is more advantageous in the latter case for the two wall strips or wall halves to diverge in a V shape, so that when cables are inserted the strips or halves move simultaneously towards one another into the parallel position shown in Figure 21.

Figures 22 to 25 show a particularly favourable form of cable clip, in which the wall is formed by a longitudinal loop 31, which can spring open and which extends in an elongation of the opening 9, and a transverse loop 32 of the same length which can spring open independently of the first. In view of the ranges of cross-sections to be

accommodated, the distance between the longitudinal loop 31 and the ends 2 of the wall is preferably twice as great as the distance between the transverse loop 32 and the ends 2.

This form of clip can be produced particularly simply if the longitudinal loop 31 and transverse loop 32 are each moulded as a unit with half a base portion 3, and the two units are joined together at the tips 7 of the splaying out base portions 3, each by a film hinge 33. The two units then have to be placed together and can be held in the assembled state by using two pins 35 and two corresponding holes 34 inside the two units.

Claims

1. A clip for holding cables, bundles of cables, tubes and the like elongate elements, comprising a wall which envelopes the cable or the like and which is provided with an opening at the underside, wherein each of the abutting ends of the wall is joined to half of a resiliently compressible expanding limb for insertion in corresponding fixing holes in a supporting plate, and to a supporting shoulder projecting laterally from the wall, wherein parts of the wall 1 project inwardly, and symmetrically to the opening in the clip, to limit the size of the vacant interior space of the clip for receiving an element and which are adapted to move resiliently to increase the size of the space.

2. A cable clip according to claim 1, wherein the wall portions comprise two adjacent spring arms attached close together to the side of the wall opposite the opening and diverging in a funnel shape substantially in the last third of their length remote from the wall above the opening.

3. A cable clip according to claim 2, including a lug which acts as a bending aid provided one at each side of the opening, and spaced from the free end of each spring arm, wherein the lugs project in such a way that, when thick cables or elements are inserted in the space, the arms spring over the lugs, bend outwardly, and lie against the wall of the clip.

4. A cable clip according to claim 1, wherein two spring arms are attached to the wall, one at each side of the opening, to converge in an ogival shape substantially in the centre of the clip, and in addition a shim is resiliently attached to the wall in the space above the region where the arms 13 open resiliently.

5. A cable clip according to claim 1, wherein a resilient spring strip bent into an omega shape is provided inside the wall having curved ends joined to the wall at each side of the opening, so that when the curved ends have been sprung open completely the spring strip comes into contact with the wall 1.

6. A cable clip according to claim 1, wherein two parallel wall parts attached resiliently one at each side of the opening 9, are joined by loops of spring strip to a transverse wall part arranged substantially in the centre of the space in the clip, in such a way that the total length of all the wall parts and the loops of spring strip is substantially equal to the peripheral length of the wall 1 of the clip between the points of attachment of the wall parts to the wall.

7. A cable clip according to claim 1, wherein the wall parts comprise a plurality of spring arms are attached to the wall and distributed evenly along the wall periphery, occupying the interior space of the clip except for a vacant region, and that the arms are directed to the centre of the vacant region with each arm inclined to radial lines R extending from the said centre of the points of attachment of the arms at an angle of from 5 to 15° in the same direction.

8. A cable clip according to claim 7, wherein the distances between the points of attachment of the spring arms are slightly greater than the lengths of the arms.

9. A cable clip according to claim 1, wherein the wall parts comprise a plurality of spring arms attached to the wall 1, distributed evenly along its periphery, directed radially towards the centre of the vacant space near at the opening, and extending outwardly beyond the sides of the clip, the arms being attached in such a way that they can move resiliently in radial planes through the centre of the space and are successively inclined in alternate directions.

10. A cable clip according to claim 1, wherein at the side opposite the opening an arcuate wall part of the stable shape is joined by ear-shaped side wall parts to similar arcuate end wall parts of stable shape, and that the ear-shaped side wall parts are adapted to open resiliently.

11. A cable clip according to claim 10, wherein spring arms are attached to the wall of the clip at both ends of the arcuate central parts, the arms pointing into the interior space of the clip and substantially overlapping the cavities within the ear-shaped parts.

12. A cable clip according to claim 1, wherein the wall is formed by a transverse wall part and two side wall parts extending outwardly in a funnel shape from the opening, and that the wall 29, 30 of the clip is divided along its whole length.

13. A cable clip according to claim 1, wherein the wall of the clip is formed by a longitudinal loop part extending from and a transverse loop part of the same total length, adapted to open resiliently independently of the longitudinal loop part, and the distance between the end of the longitudinal loop and the ends of the wall at the opening is substantially twice as great as the distance between the portion of the transverse loop opposite the opening and the ends of the wall at the opening.

14. A cable clip according to claim 13, wherein the longitudinal loop part and transverse loop each form a unit with half a base portion comprising the expanding part limbs and are joined together at the tips 7 of the expanding base by film hinges so that when the two units are placed together side by side they can be fixed together in the region of the shoulders 4 by a appropriate hole and pin connection.

15. A clip for holding cables, tubes, and other elongate elements constructed and arranged substantially as described and shown in Figures 1—3, 4 and 5, 6 and 7, 8 and 9, 10 and 11, 12—15, 16 and 17, 18—21, or 22—25 of the accompanying drawings.

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